NO. 2

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R E P O R T

to

Philip Morris Incorporated

Report No. 16

Contract C-172

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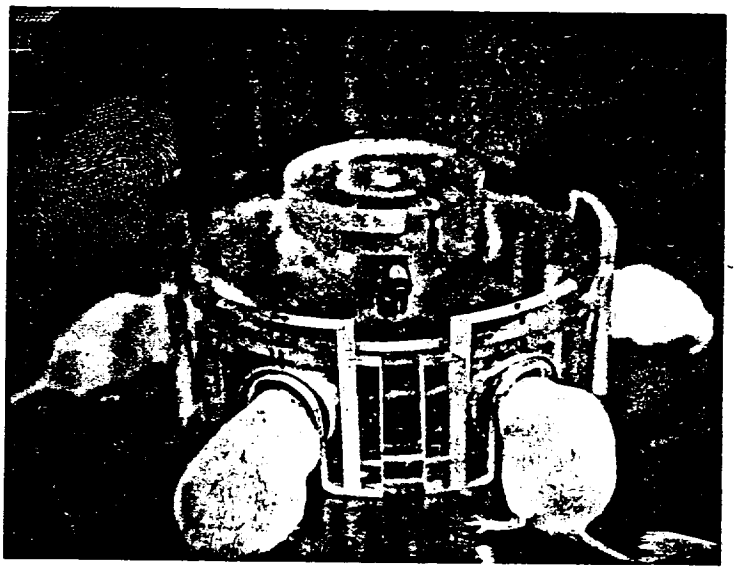

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STUDIES ON SALIVATION

We previously reported on experimental procedures designed to reduce variability of base-salivation in Millerton Swiss mice with the hope of obtaining a more standardized methodology for salivation. In addition, experiments were initiated wherein salivation was altered by means of salivation-inhibiting and/or salivation-stimulating drugs.

The present report incorporates the following:

A. Further development of technical capabilities for Project C172.

B. Experiment designed to improve standardization of salivation procedure.

C. Provisional procedure for experiments in which smoke and/or drug treatments are applied.

D. Experiment on effect of atropine on salivation of preselected mice.

E. First series of pilot experiments on cigarette smoke effects on salivation.

A. Further development of technical capabilities for Project C172

1. Smoking machine attachment - A new attachment to the smoking machine has been developed in order to permit application of cigarette smoke in a quantitative manner to collared mice. Animals can now be exposed to smoke, with measurement of salivation immediately afterwards. A photograph of the machine incorporating this attachment is appended.

2. Statistical programs - During the past few months, statistical programs have been developed to exploit the technical capabilities of the 370 Wang computer. These programs, seven of which are now in a functional state (see Table 25), make possible the effective statistical analysis of experimental data.

B. Experiment designed to improve standardization of salivation procedure

The experiments described in this report incorporated male Ha/IRC Millerton Swiss mice, approximately twenty-two to thirty weeks of age, and housed six to a cage, each collared and consecutively numbered. The mice studied in the respective experiments had prior experience with the salivation technique.

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Reports 12 and 14 presented experimental data indicating that sex, days and number of measurements during each day affect base-salivation in mice. These conclusions are based on data from experiments conducted for up to four consecutive days and five base-salivation measurements during each day. It was pointed out that under these experimental conditions, we had not as yet reached our goal establishing conditions for obtaining a base-salivation plateau over time.

This experiment was designed to incorporate a larger number of experimental days, as well as salivation measurements during each day, with the aim of obtaining a steady base-salivation over time.

The experiment was conducted with two groups (I and II) of eighteen mice each. Each group contained six "low", six "medium" and six "high" salivators, as determined by a one-day salivation test performed on these mice approximately six weeks prior to initiation of this experiment. The "low" salivating range was from 0-16.7 mm; the "medium," from 16.7 to 25.00 mm, and the "high," above 25.0 mm of boundary displacement.

Group I mice were salivated over a two-week period, four and five consecutive days during the first and second weeks, respectively. The first daily salivation started at 9:00 a.m. and was performed at eight hourly intervals. Conversely, Group II mice were salivated only four times daily, with intervals of two hours between salivation measurements. Their first daily salivation began at 9:30 a.m.

Immobilization of mice for salivation was achieved by fitting their collars to stanchions; salivation was initiated using a No. 5 bit. The amount of saliva produced during a ten-minute period was measured and the data recorded. The data were analyzed primarily by means of the analysis of variance technique, making use of the Wang computer system and presently available programs.

In addition to the above-outlined experiment, an additional experiment was superimposed. Its purpose was to examine whether the act of injecting per se or placebo injections incorporating 0.1 ml of water or isotonic saline would affect base-salivation. This experiment is of importance as a control for atropine experiments. The two groups of eighteen mice were injected subcutaneously ten minutes prior to their scheduled 11:00 and 11:30 salivations on the second day of the first experimental week.

Table 1 presents the base-salivation results obtained in this experiment. Tables 2, 3 and 4 describe various analyses of variance, indicating that injection per se and placebo injections with water or isotonic saline, have no significant effect on the base-salivation rate when measured ten minutes, or two hours and ten minutes, following injection.

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Tables 5 and 6 describe base-salivation results obtained during the second experimental week in mice salivated at eight and four bi-hourly intervals, respectively. Tables 7 and 8 provide the analyses of variance pertaining to these data. The average base-salivation rate was found to be considerably higher in mice salivated at four bi-hourly intervals compared to those salivated at eight intervals (40.4 mm vs. 32.9 mm). Diurnal differences in base-salivation were found to be statistically insignificant with both measurement frequencies; however, differences in base-salivation were found over days.

It is interesting to note that these differences were primarily due to a quadratic component, representing lowered salivation at the beginning and end of the second week, whereas higher salivations occurred during the middle of the week. This effect appeared more pronounced in mice salivated at four bi-hourly intervals than those salivated at eight intervals. These results suggest that the eight daily measurements reduce the systematic time effects on salivation and promote a more stable base-salivation plateau. Additional experiments are necessary before any definite conclusions can be drawn.

Tables 9, 10, 11, 12 and 13 provide additional experimental evidence that a one-day typing for salivation levels contributes significantly to a reduction of variability in salivation rate, even after a period of eight weeks.

C. Provisional procedure for experiments in which smoke and/or drug treatments are applied

On the basis of the experimental results described in Reports 12, 14 and herein, the following tentative experimental procedure seems most optimal at the present time. The size of the experiment dictates the number of stanchions, as well as the number of technicians required. Male mice of approximately the same age should be used, pretyped for their salivation performance level. Preselected mice should be chosen as seems most optimal for the experiment or systematically assigned in order to obtain an equal representation of "low," "medium" and "high"-salivating mice in each treatment group. For practical purposes, it seems justified to require at least ten mice for each treatment group level. Salivation rate determinations should be taken at hourly intervals during the day, the first two salivations reestablishing the control salivation level of each animal during that particular day. The third salivation could serve as the treatment salivation, whereas any additional salivation measurements could serve to monitor possible aftereffects. Such an experimental design, aimed at reducing error variance in salivation, has the advantage of affixing certain experimental variables through which data from future experiments might become comparable and the results pooled.

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D. Experiment on effect of atropine on salivation of preselected mice

Reports 12 and 14 established that subcutaneous atropine sulfate significantly inhibits salivation ten minutes after injection. The dose range of .66 mg to .20 mg of atropine sulfate per animal was apparently too narrow to show any clear-cut dose dependence of this inhibition.

The experiment to be reported here was designed to examine the effects of lower doses of atropine sulfate on salivation in order to ascertain the minimal amount of subcutaneously-injected atropine sulfate that inhibits salivation.

Thirty-six male mice, pretyped for their base-salivation level nine weeks prior to this experiment, were incorporated into this experiment. Eighteen of the mice were previously studied in the two-week salivation experiment (reported above), with an interval of one week between experiments (adapted mice). The remaining eighteen mice had not been utilized in any salivation experiments for a period of at least one month (non-adapted mice). The mice were assigned to one of six atropine sulfate treatment groups namely, Group I, control (H_2O); Group II, 1×10^{-7} mg; Group III, 1×10^{-6} mg; Group IV, 1×10^{-5} mg; Group V, 1×10^{-4} mg, and Group VI, 1×10^{-3} mg, per animal. To each treatment group were assigned a "low," "medium," and "high"-adapted and non-adapted mouse, respectively. The mice were salivated at eight hourly intervals for two days. Treatments were applied ten minutes prior to the third salivation measurement on the second day.

Table 14 describes the base-salivation performance during the first salivation day of "adapted," "non-adapted," "low," "medium" and "high" pretyped mice, whereas Table 15 provides its statistical analysis. These results indicate that "adaptation" under our experimental conditions does not affect salivation performance. Table 16 presents the salivation performance of the mice during the second salivation day; Tables 17 through 20 provide analyses of variance of specific aspects of these results. The results describe any differences in base-salivation among the various treatment groups during the first, fourth and fifth measurements as insignificant, indicating that mice in the various treatment groups have equal salivation levels and that the injections did not cause any apparent aftereffects. Salivation was significantly inhibited by subcutaneously-injected atropine sulfate, the threshold being somewhere between 1×10^{-3} mg and 1×10^{-4} mg.

E. First series of pilot experiments on cigarette smoke effects on salivation

Experiment 1 - The effects of cigarette smoke were studied using the experimental procedure outlined under topic C of this report. Twelve mice (not selected by pretyping) were randomly assigned to one of two treatment groups, consisting of

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six mice each. Treatment I incorporated a ten-minute smoke exposure with one Pall Mall cigarette; Treatment II did not involve exposure to a smoking machine or smoke. Smoke was applied immediately prior to the third salivation measurement.

Table 21 presents the obtained results, indicating that machine smoking tends to inhibit salivation at ten minutes, and one hour and ten minutes, after exposure. However, these effects were not statistically significant, possibly due to the small number of mice in each treatment group.

Experiment 2 - This experiment was conducted in analogy to the procedure described in Experiment 1, with the addition of one treatment group (positive control, smoking machine only).

The results, presented in Tables 22A, 22B, 22C and 22D, indicate that smoking with one Pall Mall cigarette for ten minutes significantly inhibits salivation and that this inhibitory effect tends to remain present for as long as one hour and ten minutes after smoke exposure.

Experiment 3 - This experiment compares the effect of smoking of one Pall Mall and one Sano cigarette, the results and statistical analyses of which are summarized in Tables 23A, 23B, 23C, 23D and 23E. These data confirm the earlier finding that Pall Mall significantly inhibits salivation. This inhibitory effect on salivation is significantly noticeable for up to one hour and ten minutes following smoke exposure.

In contrast to Pall Mall smoke, Sano cigarette smoke did not inhibit salivation.

Experiment 4 - This experiment compares Pall Mall smoke, with and without nose-clipping, on salivation in mice. Tables 24A, 24B, 24C and 24D describe the results obtained. These results indicate considerable variability in salivation performance. Salivation was inhibited significantly with Pall Mall, both with and without nose-clipping.

We prefer not to draw any conclusions from these experiments before replicates have been performed. It should be noted that these are preliminary experiments preceding larger, more carefully controlled future experiments. These pilot studies familiarized our technical personnel with the design and operation of the smoking machine.

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Table 1

Effect of Subcutaneous Injection of 0.1 ml Double Distilled Water or Isotonic Saline Ten Minutes Prior to Initiation of Salivation on Base Salivation of Male Millerton Swiss Mice, Twenty-two to Twenty-four Weeks Old

		HOUR		
		9:00 a.m.	11:30 a.m.	1:30 p.m.
Control	Low	15.0†	17.5	19.5
	Medium	37.5	59.0	45.0
	High	46.5	35.0	47.5
	Mean	33.0	37.2	37.3
H_2O	Low	10.0	22.0	12.5
	Medium	27.0	15.0	32.5
	High	40.0	42.5	35.5
	Mean	25.7	26.5	26.8
Saline	Low	32.5	35.0	30.0
	Medium	27.5	15.0	34.0
	High	37.5	44.0	54.5
	Mean	32.5	31.3	39.5
	Overall Mean	30.4	31.7	34.6
Control	Low	35.0	40.0	24.0
	Medium	36.0	35.0	55.0
	High	75.0	33.5	70.0
	Mean	48.7	36.2	49.7
H_2O	Low	12.5	19.5	7.5
	Medium	15.5	30.0	26.5
	High	37.5	31.0	35.0
	Mean	21.8	26.8	23.0
Saline	Low	22.5	35.0	18.5
	Medium	34.0	14.0	61.0
	High	50.5	77.5	58.5
	Mean	35.7	42.2	46.0
	Overall Mean	35.4	35.1	39.6

8 X

4 X

† Mean of two base-salivation measurements.

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Table 2

Analysis of Variance of mm Salivated by Male Millerton Swiss Mice Ten Minutes after Injection

Source	D F	S S	M S	F cal	F 95%
Total (35-2=)†	33	18,170			
Frequency (F)	1	103	103	.18	4.49
Types (Ty)	2	2,006	1,003	1.75	3.63
Treatments (Tr)	2	807	403	.70	3.63
F x Ty	2	203	102	.18	3.63
F x Tr	2	252	126	.22	3.63
Ty x Tr	4	3,608	902	1.57	3.01
F x Ty x Tr	4	2,013	503	.88	3.01
Error (18-2=)†	16	9,178	574		

† Error and total degrees of freedom are adjusted due to missing observations.

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Table 3

Analysis of Variance: Differences between Salivation Ten Minutes after Injection and Salivation Two Hours Prior to Injection in Male Millerton Swiss Mice

Source	D F	S S	M S	F cal	F 95%	F 99%
Total (35-2=)†	33	14,855				
Frequency (F)	1	23	23	.06	4.49	8.53
Types (Ty)	2	780	390	1.04	3.63	6.23
Treatments (Tr)	2	388	194	.22	3.63	6.23
F x Ty	2	114	57	.15	3.83	6.23
F x Tr	2	1,038	519	1.38	3.63	6.23
Ty x Tr	4	4,896	1,224	3.26*	3.01	4.77
F x Ty x Tr	4	1,623	406	1.08	3.01	4.77
Error (18-2=)†	16	5,993	375			

† Error and total degrees of freedom are adjusted due to missing observations.
* Significant at the .05 level.

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Table 4

Analysis of Variance of Differences between Salivation Two Hours and Ten Minutes after Injection and Salivation Two Hours Prior to Injection in Male Millerton Swiss Mice

Source	D F	S S	M S	F cal	F 95%	F 99%
Total (35-2=)†	33	7,937				
Frequency (F)	1	0	0	0	4.49	8.53
Types (Ty)	2	1,471	736	2.51	3.63	6.23
Treatments (Tr)	2	378	189	.65	3.63	6.23
F x Ty	2	725	363	1.24	3.63	6.23
F x Tr	2	67	33	.11	3.63	6.23
Ty x Tr	4	403	202	.69	3.01	4.77
F x Ty x Tr	4	211	53	.18	3.01	4.77
Error (18-2=)†	16	4,682	293			

† Error and total degrees of freedom are adjusted due to missing observations.

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Table 5

Base Salivations of Male Millerton Swiss Mice During the Second Experimental Week When Salivated at Eight Hourly Intervals Each Day

Hour	DAY 5	6	7	8	9	Total	Mean
9:00 a.m.	350†	497	369	328	271	1,815	30.2
10:00 "	409	430	362	399	370	1,970	32.8
11:00 "	371	430	433	596	355	2,185	36.4
12:00 "	370	445	459	403	300	1,977	33.0
1:00 p.m.	368	384	438	460	383	2,033	33.9
2:00 "	376	422	394	393	339	1,924	32.1
3:00 "	305	397	407	421	351	1,881	31.4
4:00 "	440	419	411	371	360	2,001	33.4
Total	2,989	3,424	3,273	3,371	2,729	15,786	
Mean	31.1	35.7	34.1	35.1	28.4		32.9

† Sum of 12 salivations.

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Table 6

Base Salivations of Male Millerton Swiss Mice During the Second Experimental Week When Salivated Four Times Each Day with Two Hours between Salivations

Hour	DAY 5	6	7	8	9	Total	Mean
9:30 a.m.	565†	569	647	593	471	2,845	37.9
11:30 "	572	647	731	746	478	3,174	42.3
1:30 p.m.	541	669	677	655	431	2,973	39.6
3:30 "	559	696	699	663	521	3,138	41.8
Total	2,237	2,581	2,754	2,657	1,901	12,130	
Mean	37.3	43.0	45.9	44.3	31.7		40.4

† Sum of 15 salivations.

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Table 7

Split Plot Analysis of Variance (Sub-unit Basis) of mm Salivated by 8 x Mice During Week Two of Ten-Day Standardization Experiment

Source	D F	S S	M S	F cal	F 95%	F 99%
Total (479-52=)†	427	221,996				
Units	11					
Types (Ty)	2	40,922	20,461	2.78	4.26	8.02
Unit error	9	66,320	7,369			
Sub-units						
Times	39					
Hours (H)	7	1,420	203	.71	2.04	2.71
Days (D)	4	3,562	890	3.11*	2.40	3.39
Linear	1	342	342	1.20	3.88	6.73
Quadratic	1	2,700	2,700	9.44**	3.88	6.73
Remainder	2	520	260	.91	3.03	4.69
D x H	28	5,392	193	.67		
Times x Types	78					
H x Ty	14	4,194	300	1.05	1.73	2.15
D x Ty	8	3,192	399	1.40	1.97	2.58
H x D x Ty	56	11,439	204	.71	1.40	1.59
Sub-unit error (351-52=)†	299	85,555	286			

† Error and total degrees of freedom are adjusted due to missing observations.
* Significant at the .05 level.
** " " " .01 "

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Table 8

Split Plot Analysis of Variance (Sub-unit Basis) of mm Salivated by 4 x Mice During Week Two of Ten-Day Standardization Experiment

Source	D F	S S	M S	F cal	F 95%	F 99%
Total (299-30=)†	269	145,710				
Units	14					
Type (Ty)	2	24,533	12,266	3.39	3.88	6.93
Unit error	12	43,465	3,622			
Sub-units						
Times	19					
Hours (H)	3	931	310	1.06	2.65	3.88
Days (D)	4	8,272	2,068	7.08**	2.41	3.41
Linear	1	592	592	2.03	3.89	6.76
Quadratic	1	7,263	7,263	24.87**	3.89	6.76
Remainder	2	417	209	.72	3.04	4.71
D x H	12	1,014	85	.29	1.80	2.28
Times x Types	38					
H x Ty	6	986	164	.56	2.14	2.90
D x Ty	8	2,566	321	1.10	1.98	2.60
H x D x Ty	24	6,084	254	.87	1.57	1.88
Sub-unit error (228-30=)†	198	57,859	292			

† Error and total degrees of freedom are adjusted due to missing observations.
** Significant at the .01 level.

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Table 9

Base Salivations of "Low", "Medium" and "High"-Typed Male Millerton Swiss Mice During the Second Experimental Week When Salivated at Eight Hourly Intervals Each Day

Type	DAY 5	6	7	8	9	Total	Mean
Low	700†	706	749	758	721	3,634	22.7
Medium	862	1,054	1,154	1,052	820	4,942	30.9
High	1,427	1,664	1,370	1,561	1,188	7,210	45.1
Total	2,989	3,424	3,273	3,371	2,729	15,786	
Mean	31.1	35.7	34.1	35.1	28.4		32.9

† Sum of 32 salivations (4 mice, 8 salivations each).

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Table 10

Base Salivations of "Low", "Medium" and "High"-Typed Male Millerton Swiss Mice During the Second Experimental Week When Salivated Four Times Each Day with Two Hours between Salivations

Type	DAY					Total	Mean
	5	6	7	8	9		
Low	586†	620	684	722	437	3,049	30.5
Medium	725	826	928	708	657	3,844	38.4
High	926	1,135	1,142	1,227	807	5,237	52.4
Total	2,237	2,581	2,754	2,657	1,901	12,130	
Mean	37.3	43.0	45.9	44.3	31.7		40.4

† Sum of 20 salivations (5 mice, 4 salivations each).

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Table 11

Base Salivations of "Low," "Medium" and "High"-Typed Male Millerton Swiss Mice During the Second Experimental Week When Salivated at Eight Hourly Intervals Each Day for Five Consecutive Days

Type	HOUR									
	9:00 a.m.	10:00 a.m.	11:00 a.m.	12:00 noon	1:00 p.m.	2:00 p.m.	3:00 p.m.	4:00 p.m.	Total	Mean
Low	398†	447	441	496	509	424	417	502	3,634	22.7
Medium	617	726	674	595	668	626	525	511	4,942	30.9
High	800	797	1,070	886	856	874	939	988	7,210	45.1
Total	1,815	1,970	2,185	1,977	2,033	1,924	1,881	2,001	15,786	
Mean	30.2	32.8	36.4	33	33.9	32.1	31.4	33.4		32.9

† Sum of twenty observations (four mice over five days).

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Table 12

Base Salivations of "Low", "Medium" and "High"-Typed Male Millerton Swiss Mice During the Second Experimental Week When Salivated Four Times Each Day with Two Hours between Salivations

Type	HOUR				Total	Mean
	9:30 a.m.	11:30 a.m.	1:30 p.m.	3:30 p.m.		
Low	651†	892	711	795	3,049	30.5
Medium	977	938	927	1,002	3,844	38.4
High	1,217	1,344	1,335	1,341	5,237	52.4
Total	2,845	3,174	2,973	3,138	12,130	
Mean	37.9	42.3	39.6	41.8		40.4

† Sum of 25 observations (5 mice over 5 days).

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Table 13

Correlations of Typing (T) Score, Week (W) One and Week Two Base Salivation Means for Mice Salivated Four or Eight Times Per Day

	T, W 1	T, W 2	W 1, W2
4 X	.48 (14)†	.38 (15)	.83 (14)
8 X	.55 (12)	.67 (12)	.78 (12)

† Number of animals in each group.

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Table 14

Mean Base Salivations of Adapted and Non-adapted, Typed, Male Millerton Swiss Mice Salivated at Eight Hourly Intervals from 9:00 a.m. to 4:00 p.m.

	Low	Medium	High	Mean
Adapted	19† (6)#	26 (3)	29 (5)	24 (14)
Non-adapted	17 (6)	34 (6)	27 (6)	26 (18)
Mean	18 (12)	32 (9)	28 (11)	25 (32)

† Average mm salivated per measurement in each group of mice.
# Number of animals in each group.

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Table 15

Analysis of Variance of Mean Base Salivations of Adapted and Non-adapted, Typed, Male Millerton Swiss Mice Salivated at Eight Hourly Intervals from 9:00 a.m. to 4:00 p.m.

Source of Variation	D F	S S	M S	F cal	F 95%	F 99%
Groups	5	1,258	252	1.40	2.59	3.82
Error	26	4,679	180			
Total	31	5,937				

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Table 16

Effect of Atropine Administered Subcutaneously Ten Minutes Prior to the Third Salivation upon Base Salivation of Male Millerton Swiss Mice

Treatment	No. Mice Treated	MEASUREMENT							
		1	2	3	4	5	6	7	8
		9:00 a.m.	10:00 a.m.	11:00 a.m.	12:00 noon	1:00 p.m.	2:00 p.m.	3:00 p.m.	4:00 p.m.
.001 mg atropine sulfate	5	28†	21	4	18	20	18	38	22
.0001 " "	6	30	33	21	25	17	17	26	37
.00001 " "	6	18	24	24	18	27	27	24	21
.000001 " "	5	31	37	31	32	35	43	27	31
.0000001 " "	4	36	35	16	17	13	19	20	10
H_2O	6	32	22	28	24	22	33	25	24

† Mean base salivation per mouse.

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Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000

Table 17

Analysis of Variance of Results of Measurement 1

Source of Variation	D F	S S	M S	F cal	F 95%	F 99%
Treatments	5	955	191	0.88	2.59	3.82
Error	26	5,672	216			
Total	31	6,627				

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Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000

Table 18

Analysis of Variance of Results of Measurement 3

Source of Variation	D F	S S	M S	F cal	F 95%	F 99%
Treatments	5	2,438	488	3.62*	2.59	3.82
Trt. 1 vs. Trts. 2-6	1	1,682	1,682	12.46**		
Remainder	4	756	189	1.40		
Error	26	3,500	135			
Total	31	5,938				

* Significant at the .05% level.
** Significant at the .01% level.

10031125 76

Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000

Table 19

Analysis of Variance of Results of Measurement 4

Source of Variation	D F	S S	M S	F cal	F 95%	F 99%
Treatments	5	870	174	.76	2.59	3.82
Error	26	5,962	229			
Total	31	6,832				

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Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000

Table 20

Analysis of Variance of Results of Measurement 5

Source of Variation	D F	S S	M S	F cal	F 95%	F 99%
Treatments	5	1,440	288	.98	2.59	3.82
Error	26	7,667	295			
Total	31	9,108				

100311257B

Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000

~~Table 21~~

Immediate and Residual Effects on Salivation Rates of a Ten Minute Exposure to Smoke (Pall Mall) Prior to the Third Salivation

Table 21 A. Mean Salivations for Treated and Control Mice

Treatments	Measurements (taken at hourly intervals)			
	1	2	3	4
Smoke (Pall Mall)	30.8 (6)*	31.2	13	20.3
Control (No exposure to smoke or machine)	35.6 (5)	30.4	20.4	35.0

* Number of observations on which all means in this line are based.

Table 21 B. Analysis of Variance of Measurement 3, the measurement taken immediately after the exposure to smoke

Source	DF	SS	MS	F cal	F 95%	F 99%
Treatments	1	149.3	149.3	1.58	5.12	10.56
Error	9	849.2	94.4			
Total	10	998.5				

100311257

Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000

~~Table 21 C.~~ Analysis of Variance of Measurement 4, the measurement taken one hour after the exposure to smoke

Source	DF	SS	MS	F cal	F 95%	F 99%
Treatments	1	586.7	586.7	1.03	5.12	10.56
Error	9	5123.3	569.3			
Total	10	5710.0				

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Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000

Table 22

Immediate and Residual Effects on Salivation Rates of a Ten Minute Exposure to Smoke (Pall Mall) Prior to the Third Salivation

Table 22 A. Mean Salivations for Treated, Positive Control and Control Groups

Treatments	Measurements (taken at hourly intervals)			
	1	2	3	4
Smoke (Pall Mall)	29.6 (12)*	20.7	9.4	15.2
Positive Control (smoking machine only)	33.3 (12)	20.9	26.6	18.1
Control (no exposure to smoke or machine)	33.8 (11)	22.4	21.9	27.2

* Number of observations on which all means in this line are based.

Table 22 B. Analysis of Variance of Measurement 3, the measurement taken immediately after the exposure to smoke

Source	DF	SS	MS	F cal	F 95%	F 99%
Treatments	2	1883.4	941.7	4.33*	3.30	5.34
Error	32	6956.7	217.4			
Total	34	8840.2				

* Significant at the .05 level.

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Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000

Table 22 C. A Comparison of the Three Treatment Means on Measurement

Treatment	S (PM)	C	PC
Mean	9.4	21.9	26.6 *

* A line joining two means indicates that there is no significant difference between the two means; the absence of a line indicates that there is a significant difference between the two means.

Table 22 D. Analysis of Variance of Measurement 4, the measurement taken one hour after the exposure to smoke

Source	DF	SS	MS	F cal	F 95%	F 99%
Treatments	2	891.7	445.8	2.15	3.30	5.34
Error	32	6634.2	207.3			
Total	34	7525.9				

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Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000

Table 23

Immediate and Residual Effects on Salivation Rates of a Ten Minute Exposure to Smoke (Pall Mall or Sano) Prior to the Third Salivation

Table 23 A. Mean Salivations for Treated, Positive Control and Control Groups

Treatments	Measurements (taken at hourly intervals)			
	1	2	3	4
Smoke (Pall Mall)	37.4 (12)*	29.6	10.8	9.5
Smoke (Sano)	37.8 (9)	43.3	27.7	38.0
Positive Control (smoking machine only)	40.4 (11)	30.5	23.5	18.5
Control (no exposure to smoke or machine)	44.1 (12)	28.8	25.7	28.0

* Number of observations on which all means in this line are based.

Table 23 B. Analysis of Variance of Measurement 3, the measurement taken immediately after the exposure to smoke

Source	DF	SS	MS	F cal	F 95%	F 99%
Treatments	3	1979.3	659.8	3.49*	2.84	4.31
Error	40	7555.6	188.9			
Total	43	9534.9				

* Significant at the 0.05 level

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Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000

Table 23 C. A Comparison of the Four Treatment Means on Measurement 3

Treatment	S (PM)	PC	C	S (S)
Mean	10.8	23.5	25.7	27.7

Table 23 D. Analysis of Variance of Measurement 4, the measurement taken one hour after the exposure to smoke

Source	DF	SS	MS	F cal	F 95%	F 99%
Treatments	3	4732.7	1577.6	6.27*	2.84	4.31
Error	40	10063.7	251.6			
Total	43	14796.4				

* Significant at the .01 level.

Table 23 E. A Comparison of the Four Treatment Means on Measurement 4

Treatment	S (PM)	PC	C	S (S)
Mean	9.5	18.5	28.0	38.0

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Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000

Table 24

Immediate and Residual Effects on Salivation Rates of a Ten Minute Exposure Prior to the Third Salivation

Table 24 A. Mean Salivations for Treated, Positive Control and Control Groups

Treatments	Measurements (taken at hourly intervals)			
	1	2	3	4
Smoke (Pall Mall)	46.5 (12)*	34.3	14.7	22.3
Smoke (Pall Mall) + nose clips	40.4 (10)	21.8	5.8	17.2
Positive Control (smoking machine only)	40.8 (12)	34.8	19.5	22.8
Control (no exposure to smoke or machine)	43.4 (11)	47.6	38.1	28.7

* Number of observations on which all means in this line are based.

Table 24 B. Analysis of Variance of Measurement 3, the measurement taken immediately after exposure to smoke

Source	DF	SS	MS	F cal	F 95%	F 99%
Treatments	3	5957.1	1985.7	6.87*	2.83	4.30
Error	41	11848.2	288.9			
Total	44	17805.3				

* Significant at the .01 level.

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Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000

Table 24 C. A Comparison of the Four Treatment Means on Measurement 3

Treatment	S (PM) + NC	S (PM)	PC	C
Mean	5.8	14.7	19.5	38.1

Table 24 D. Analysis of Variance of Measurement 4, the measurement taken one hour after the exposure to smoke

Source	DF	SS	MS	F cal	F 95%	F 99%
Treatments	3	703.5	234.5	.605	2.83	4.30
Error	41	15891.7	387.6			
Total	44	16595.2				

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Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000

Table 25

STATISTICAL PROGRAMS

Developed for Use on the Wang 370 Computer System

Program 29:	Two-way analysis of variance with one observation per cell. (for 16-20 rows and unlimited number of columns)
Program 30:	Two-way analysis of variance with one observation per cell. (for up to 15 rows and unlimited number of columns)
Program 31:	Two-way analysis of variance with n observations per cell. (for up to 12 rows and unlimited number of columns)
Program 32:	Two-way analysis of variance with proportional cell frequencies. (for up to 8 rows and unlimited number of columns and unlimited number of observations per cell)
Program 33:	One-way analysis of covariance with one covariant. (for an unlimited number of treatments and an unlimited number of subjects in each treatment group)
Program 34:	One-way analysis of variance. (for an unlimited number of treatments and an unlimited number of observations within each treatment group)
Program 35:	Summary statistics on one sample.

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Source: https://www.industrydocuments.ucsf.edu/docs/xgyl0000